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British Guiana.



REPORT

ON THE

DEPARTMENT OF SCIENCE AND
AGRICULTURE,

FOR THE YEAR

1927.

Printed by the Authority of His Excellency the Governor.

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REPORT ON THE DEPARTMENT OF SCIENCE AND AGRICULTURE FOR THE YEAR 1927.

The following is the report on the working of the Department of Science and Agriculture for the year ended December, 1927. Appended are reports relating to the several divisions of the Department as follows :—

- (1) Analytical division by the Government Analyst.
- (2) Biological division by the Government Biologist.
- (3) Agricultural Instruction by the Travelling Inspector.
- (4) Botanic Gardens by the Horticultural Superintendent.
- (5) Veterinary division by the Acting Government Veterinary Surgeon.

The meteorological observations for 1927 are published as a separate report, abstracts of which are given in this report.

I am unable to include the Report on Botany and Mycology, as I have not received it from the officer in charge who went on leave last September, when he represented the Colony at the Imperial Agricultural Conference, after which he accepted an appointment in Malaya. Mr. Altson, however, did much useful work during the year on various problems, including studies on Haiari and other plants of insecticidal value.

STAFF.

Head Office.—Mr. W. Francis, F.I.C., continued to act as Director of Science and Agriculture after Mr. Nowell's transfer to Amani until my arrival on July 14, 1927, on which date I assumed the duties of Director.

Mr. R. A. Altson, Assistant Government Botanist and Mycologist, was granted six months' leave of absence on full salary from September 1, 1927, during which time he attended The Agricultural Research Conference held in England.

Mr. E. M. Peterkin was seconded for service as Agricultural Superintendent from October 1, 1927, Mr. J. F. Irving, M.C., of the Immigration Department, acting as Senior Clerk.

Mr. W. H. Matthews, Agricultural Instructor, was transferred from the North West District to Berbice, and Mr. E. M. Morgan, Agricultural Instructor, from Berbice to the North West in his place.

Mr. H. A. Cole, Agricultural Assistant, received three months' leave of absence from June to August.

Mr. J. A. V. Bourne, Assistant Clerk, obtained four months' leave of absence from October 3.

Mr. W. H. Matthews was on sick leave from February 24 to March 23, and was granted two months and seven days leave on full pay and twenty-three days on half pay from March 24. He resumed duty on June 25.

EXPENDITURE.

The total vote assigned to the Department by the Combined Court at its Session in December, 1926, for the year 1927 was \$89,809. The following additions were voted on Supplementary Estimates during the year 1927 :

- \$ 80—Allowances to officers for analysis of milk on Sundays.
- \$ 500—Travelling expenses—general.
- \$ 40—Freight, Insurance.
- \$1,800—Botanic Gardens—maintenance of.
- \$ 300—Purchase, Production and Distribution of Seeds and Plants.
- \$ 500—Experimental Fields—Rice and other Products.
- \$ 71—Cost of passage of Director and family to Colony.

The total amount of the Estimates was therefore \$93,100. Of this amount there was at December 31, 1927, an unexpended balance of \$4,711.74 as shewn in the following table :—

TABLE I.
ANNUAL ESTIMATES, 1927.

No. of Sub-vote.	Sub-vote.	Balances Unexpended.	Excess Expenditure.
1-16	Personal Emoluments—Fixed	\$ 3,757 00	\$...
17-30	Personal Emoluments—Unfixed	72 00	...
OTHER CHARGES.			
31	Allowances for upkeep of Bicycles	20 00	
32	Commuted Travelling	239 44	
33	Travelling Expenses	...	502 82
34-41	General Expenses	...	103 50
44	Botanical	14 35	
45	Meteorological	13	
46	Biological	63	
47-48	Botanic Gardens	...	23 31
49	Other Government Gardens and Grounds	58	
50	Berbice Public Gardens	66 94	
51	Purchase, Production and Distribution of Seeds and Plants	...	178 59
52-53	Experimental Fields (Rice and Sugar Cane)	...	498 38
54-56	Department's Stations and Arable Farm	3 62	
57	Live Stock—Purchase of	573 74	
58	Live Stock—Maintenance of	179 93	
59	D'Urban Park	...	6 84
60	Cutting Grass for Police Horses	02	
61	Advertising	60 00	
62	Grants-in-aid for Exhibitions, &c.	428 72	
63	Subsidies to Agricultural Instructors	...	
64	Agricultural Apprentices	352 00	
65	Veterinary Preventive Measures	285 56	
66	Plant Pests Preventive Measures	4 13	
67	In lieu of assessments to Planters	...	
68	Contingencies	...	148 39
69	Purchase of Typewriter	10 00	
70	Nursery at Golden Grove	34 78	
71	Passage of Director and family to Colony	70 00	
	TOTAL	\$ 6,173 57	\$ 1,461 83
Saving		\$ 4,711 74	

The payments into the Treasury during the year were as follows :—

Laboratory fees	...	\$ 252 55
Agricultural Division	...	812 48
Botanical Division : Economic and Ornamental plants	...	752 17
Sale of Official Publications	...	18 38
		<u>\$1,835 58</u>

METEOROLOGY.

The following are abstracts of the Meteorological observations recorded at the Botanic Gardens, Georgetown, and at the Penal Settlement, Mazaruni, during 1927 :—

Meridian of longitude for calculation of time adopted		
as standard in the Colony	...	60° W.
Hours slow of Greenwich time	...	3.45

Georgetown.

The meteorological station is situated in the Botanic Gardens at a distance of 1.45 miles south of the coast-line. The hours of observation are 7 a.m., and 1 and 6 p.m. local official time which is 3 hours and 45 minutes behind Greenwich time. The height of the barometer is 6 feet 6 inches above the mean sea-level.

During the year 1927 the mean air temperature in the shade for the months of January, February and December was lower than the means recorded over the period 1846-1926. The highest temperature recorded was 90.5° F. on November 27, while the lowest was 70.0° F. on the night of December 16. The mean shade temperature for the year was 80.7° F. or 0.3° F. above the average from 1846 to 1926. The total rainfall was 118.63 inches as compared with 80.32 inches in the year 1926, and with 90.80 inches for the period 1880-1926. The total rainfall from January to April inclusive was 31.48 inches as compared with 3.82 inches for the same period in 1926. Heavy rains were experienced in the month of January, May, July and December. For the months of July to December inclusive, the total rainfall was 60.34 inches or 20.02 inches in excess of normal. The evaporation from a free water surface, a six feet square tank, at the ground level was 52.47 inches as compared with a normal evaporation of 57.90 inches; the evaporation for 1927 being 44.23% of the total rainfall. The total amount of bright sunshine for the year was 2,364.5 hours as compared with 2,678.6 hours in 1926 and with 2,671.7 hours in 1925 and was 94.5 hours below the average from 1846 to 1926. The mean radiation temperature (blackened bulb in vacuo) was 6.5° higher than normal and 0.6° lower than that of the previous year, the maximum monthly record during the year being 152.4° for September, while the highest daily record, 163.0° occurred on April 22. The mean minimum temperature recorded at night on grass was 1.5° higher than the average. The mean velocity of wind was 5.75 miles per hour, the maximum velocity being 16.25 miles per hour. The Anemograph recorded a gale travelling at the rate of 42 miles per hour on December 24.

Mazaruni.

A sub-station established at the Penal Settlement, Mazaruni River, is in longitude 58° 38' 45" W. and latitude 6° 23' 35" N. at a distance of 42 miles south of the coast-line. The hours of observation are the same as at the main station in Georgetown. The height of the Barometer is 55 feet above mean sea-level.

During 1927 the mean air temperature in the shade was 79.0° F., the maximum temperature recorded being 92° on September 22, while the minimum 69.5°, occurred on March 13. The total rainfall was 108.50 inches or 33.50 inches higher than that of the previous year. For the months of January, July, August, September, October, and December, the rainfall was 5.20, 4.57, 2.36, 0.63, 3.49 and 6.31 respectively, below that at Georgetown for the same months. The total rainfall for the year was 10.13 inches lower than that at Georgetown. Rain fell on 212 days in the year as compared with 211 days in Georgetown. The total amount of bright sunshine recorded during the year was 1,905.4 hours as compared with 2,364.5 hours at Georgetown.

MAJOR INDUSTRIES.

Sugar.—The routine of seedling cane experiments, as hitherto, has been in the charge of the Sugar Planters' Experiment Station's Committee. The total area in sugar cultivation in the Colony during the year 1927 was 59,271 English acres as against 58,589 acres for 1926. On the whole the sugar industry experienced a successful year from the point of view of production. The yield was equivalent to slightly over 2 tons per acre, the area reaped being 56,534 acres yielding 114,030 tons sugar, the highest production since 1916; while the export was 109,616 tons as against the figures for 1926 of 98,152 tons from 55,728 acres, with an export for that year of 84,659 tons. The rum produced was 1,436,010 gallons of which 1,081,120 gallons were exported, as against an export of 789,642 gallons in 1926. The export of molasses was 2,677,457 gallons, an increase of 659,595 gallons over

that of the previous year. With regard to cattle food, 915 tons of molascuit as against 1,075 tons for 1926 were exported. As in previous years the variety of sugar-cane mostly grown in the Colony is D. 625 ; there are also small areas of B.H. 10 (12), Diamond 10, Diamond 37, Diamond 581, B. 208, D. 118, D. 145, Ba. 6032, D. 109, D. 419, R.P. 8 and Bourbon.

In connexion with this industry, it is of interest to note the part played by cane-farmers during 1927. The more important centres appear to be Lusignan, La Bonne Intention, Albion, Hampton Court, Anna Regina and Wales. The total sums paid out for farmers' cane amounted to approximately \$42,000. The variation in the price paid per ton of cane to farmers throughout the three counties is marked. One estate paid as high as \$3.93 per ton whilst the lowest amount from another estate was \$2.41 per ton. The average price per ton paid in Trinidad for the same period was \$3.45. The factor governing difference in prices may be traced either to variation in the quality of the cane in different districts of the Colony or to variation in methods arriving at the weight of cane, for few factories in the Colony possess cane-weighing machines. The system of purchase undoubtedly requires stabilising, but as I have already pointed out, conditions generally in the country are not favourable to an extensive cane-farming industry, although in districts such as Buxton, Beterverwagting, Triumph, etc., the acreage in small holders' cane warrants the consideration between factory and grower of a scheme for placing cane-farming in those districts on a proper basis.

Rice.—The area occupied by this cereal during 1927 was 37,340 acres, but including the second crop the area actually reaped was 50,427 acres. The yield was returned as 941,694 bags of 140 lbs. of padi, a yield of 18.6 bags padi per acre.

The amount of rice exported was 11,497 tons as against 2,914 tons for 1926.

The crop at the experimental fields gave excellent returns—a yield of 27 bags (140 lbs.) padi per acre having been obtained. Unfortunately the plots contained a fairly high proportion of red and other undesirable types and much careful work will be necessary to purify the strains at present grown. Over 300 plants were selected and collected separately for starting progeny row plots. Two hundred and thirty-five bags of the best seed padi available were purchased in Essequibo with a view to assisting the rice farmers in districts where poor seed padi was prevalent. All efforts are being directed towards a pure seed supply for the Colony. Such factors as rates and dates of seeding, number of plants per hole on transplanting, etc., will also receive careful attention. The full effect of the re-arrangement of the agricultural work with rice and other crops in progress at the end of the year will not be apparent until 1928.

Coconuts.—The area under coconut palms in 1927, according to the figures furnished the Department, was 27,790 acres as against 30,502 returned as the area in 1926.

The yields were stated to have been 22,113,000 nuts, 1,508,547 lbs. copra, and 116,228 gallons of oil, but reliable returns as to produce are not obtainable. The exports for 1927 were as follows : coconuts—334,000 ; coconut oil—25,326 gallons ; copra—23,266 cwt. The figures for 1926 being : coconuts—816,000 ; oil—18,778 gallons ; copra—324,111 cwt. There is still much work to be done by coconut planters in careful selection of seed, choice of soils suitable to the plant and improvement of arterial and land drainage. Much of the trouble experienced by coconut planters in this Colony can be traced to inattention to these three factors. It would seem, too, that many deaths attributed to bud-rot are probably due to Bronze Leaf Wilt disease, which, as has been shown in Trinidad, arises from the need of soil improvement, drainage and cultivation. The whole aspect of preparation of the produce for market requires close investigation if the industry is to expand and thrive.

Coffee.—The acreage under this product during 1927, according to figures furnished the Department is 5,272 acres, a small increase on the figures for 1926, viz., 5,226 acres. Most of the coffee is Liberian and is grown on the pegass lands of the Pomeroun, the North West District and Nos. 1 and 2 Canals Polder District. These pegass areas are particularly suited to Liberian coffee and the crop can be cheaply produced. The exports were 3,844 cwts. as against 6,904 cwts. for 1926. Here again, faulty pulping and drying of the produce is a serious drawback.

Para Rubber and Balata.—The area returned under Para rubber is 1,800 acres. The actual area is very much greater than this but owing to the drop in the price of rubber and the presence of the endemic leaf disease large areas are no longer considered in the returns. The export for 1927 was 356 cwts. as against 307 in 1926.

The export of balata (*Mimusops globosa*) showed a slight increase over that of the previous year, the figures being 1927—6,723 cwts. and 1926—5,334 cwts. This is still far below the average for 1907–1924 which was 10,684 cwts.

MINOR INDUSTRIES.

Cacao.—There have been no exports of cacao for a number of years. The small quantity produced is used locally. The area is returned at 1,356 acres.

Limes.—The area under limes appears to have increased from 490 acres in 1926 to 669 acres in 1927. The export for 1927 was 5,249 gallons of concentrated juice representing about 53,000 gallons of raw juice, and 273 gallons of distilled oil of limes. The figures for 1926 were: concentrated juice—4,974 gallons and distilled oil of limes—277 gallons.

There are two factories operating, that of Messrs. S. Davson and Co., Ltd., Berbice, and a small Government Factory at the Industrial School, Onderneeming. Opportunities for this industry as well as other citrus fruits appear to exist in the North West District.

Ground Provisions.—Plantains and ground provisions are said to occupy 13,855 acres which is about 600 acres less than in 1926. Disposal of the produce during times of glut is a problem which at present is not easy of solution.

Bananas.—The 1,000 Giant Fig suckers referred to in last year's Annual Report were received from Trinidad and planted. On my assumption, I at once had these placed under proper quarantine control. This variety is resistant to Panama Disease but its carrying qualities are still in doubt.

The following extract from a Memorandum by Mr. R. A. Altson on Panama Disease of bananas shows the position at this date:

“An exhaustive examination of Departmental reports from 1880 to date shows that Panama disease of bananas has never been recorded in this Colony.

The only diseases of musaceous crops (i.e., plantains and bananas) which have been reported are the following:—

(1) A bacterial disease affecting plantains, and at least one type of banana, namely the Dwarf or Chinese (*Musa Cavendishii*).

(2) A disease said to be caused by a fungus (*Ustilaginoidella oedipigera*), known as Surinam disease or ‘elephantiasis,’ which is quite distinct from Panama disease, and of little economic importance.

(3) Anthracnose of banana fruits due to *Gloeosporium musarum*.

The bacterial disease of plantains or, as it is usually called, ‘plantain disease’ has been known in the Colony for a great number of years, but it was not until 1915 that its bacterial origin became recognised. I believe it to be identical with a

disease known in Trinidad as 'moko-disease,' which has recently been shown to be due to a bacterium (*B. Solanacearum*) known in many parts of the world as the cause of destructive wilts in several crop-plants.

The external and internal symptoms of plantain disease are very similar to those of Panama disease, and this is not surprising, for although their origins are quite distinct (Panama disease being caused by a fungus, *Fusarium cubense*), both are diseases of the vascular system. On account of this similarity, I have no doubt that cases of this bacterial disease have at times been mistaken for Panama disease. However, they differ very widely in their relation to the various types of musaceous crops. The Gros Michel or Jamaica banana is extremely susceptible to Panama disease, but resistant to the bacterial disease. On the other hand plantains, which are very susceptible to the bacterial disease are immune from Panama disease and the Dwarf banana although susceptible to bacterial disease is highly resistant to Panama disease.

The well known fact that the ravages of Panama disease were responsible for the failure of a highly organised banana industry in Surinam, has led to the belief that this disease must of necessity be present in British Guiana.

There appears to be no evidence, other than that of a casual field observation that Panama disease existed in Surinam prior to the establishment of the banana industry, that is prior to large importations of suckers from Jamaica. These importations were made in 1906. In the following year, according to a statement made by the then Surinam Government Botanist "some cases of Panama disease were noticed, but it was not yet serious." By 1908 the disease had begun to cause heavy losses and this was the beginning of the end of the Surinam industry.

It is now known (though at the time the knowledge was wanting) that in 1906, when the importations were made, Panama disease was present in Jamaica, having been introduced by labourers returning from the infected fields in Panama, and there is therefore decided justification for supposing that the disease was introduced into Surinam on the imported suckers.

Four official introductions of banana suckers into this Colony from questionable sources are on record. Three from Jamaica and one from Surinam. The three from Jamaica are not, in my opinion, open to suspicion. The first two were made at a period (in 1888 and 1890) when, it is safe to assume, Jamaica was free from the disease, for it had not then developed in Panama. The third took place in 1905, when suckers representing 27 varieties, mostly of Asiatic origin, were received from the Hope Gardens. These Gardens are known to have been free from infection at that time. The fourth introduction that of the Congo banana from Surinam in 1914, might at first be regarded with suspicion, but, considering the circumstances under which it was made, there can be little doubt that every precaution was taken to prevent the admission of the disease.

Of course, it cannot be stated as a positive fact that Panama disease is absent from British Guiana; but only that there is no evidence that it is present. Were cultivators regularly to submit suspicious cases for examination it would be possible, after a period of time, to express a more definite opinion in regard to this matter.

Suspicious cases would be cases of wilt occurring in the Gros Michel (Jamaica or Martinique) banana. Cases of wilt in plantains, Dwarf, Giant Fig (Cokerite); Congo or Red bananas do not fall into this category."

It should be added that a start has been made with the establishment of a collection of the varieties at present cultivated in the Colony with a view to systematic investigation as to their commercial possibilities. Comprehensive research work on bananas—including the problem of varietal resistance to disease and the raising and further testing of new varieties both agriculturally and commercially—

is being undertaken by the Imperial College of Tropical Agriculture, Trinidad. Until progress is made in these problems and in matters relating to carriage and transport facilities, there can be little hope of developing a remunerative banana industry in the Colony on sound business lines.

TRIALS WITH NEW CROPS.

Soon after my arrival plans were made to establish systematic experiments with crops such as tobacco, ground-nuts, pineapples, fibres, soya beans, onions, tomatoes, etc., suitable to the lighter soils of the Colony and which had hitherto been neglected.

His Excellency Sir C. H. Rodwell, who evinced unusual interest in the possibilities of ground-nut cultivation, had already started trials with this crop at his own expense on part of a sand reef belonging to Pln. Enmore, E.C., Demerara, and which he called Pln. Cecilia after his elder daughter. The experiment was carried to completion by the Department and seed of the best variety, namely "Virginia Bunch," secured for distribution to persons interested in this crop, as it was evident that an opportunity existed for small farmers to supply the local demand for ground-nuts.

On the conclusion of His Excellency's tenure, Pln. Cecilia became a sub-station of the Department and trials with the crops mentioned above, including further ground-nut investigations, inaugurated. Results from these efforts will not be available until 1928 and subsequently.

BOTANIC GARDENS.

Prompt action had to be taken during the year to renovate the Gardens generally and to further enhance their natural beauty. The report of the Horticultural Superintendent indicates in what direction progress has been achieved. Rearrangement of the shrubs into definite colour schemes will be gradually undertaken, as well as systematic labelling of the palms and trees. This will take time. Nursery work—economic and ornamental—is being extended with a view to meeting the demand which must grow with increasing agricultural and horticultural activities.

LIVESTOCK.

The livestock of the Department suffered several losses during the period under review. When these are added to those sustained in 1926, it will be noted that a steady depletion of the animals on service in different parts of the Colony has been taking place. The result is that nothing short of a vigorous policy embracing careful study of all the factors involved in animal production will suffice, if the Colony is to make any progress in this important branch of agriculture. A stock farm adequately equipped is essential for the thorough prosecution of such a policy.

PESTS AND DISEASES.

Crops and stock suffered from no calamitous outbreak of pests or disease during 1927. The appearance of the cane-aphis, *Sipha flava*, is of considerable importance and is referred to in the report of the Economic Biologist which is appended. A point of interest which should be noted in this connection is that while the insect may not cause direct losses of any magnitude, it is a potential vector of Mosaic disease which is known to occur in the neighbouring Colony of Dutch Guiana. Planters should therefore keep a sharp look-out for further outbreaks of this pest.

LOCAL FISH POISONS AND INSECTICIDES.

For numbers of years the Aboriginal Indians of this Colony have employed roots, seeds, etc., of various indigenous plants for poisoning creeks and streams whereby fish are stupefied, captured and secured as food. The fish poisons most generally in use are the roots and stems of haiari (*Lonchocarpus* spp.); the seeds of Conami (*Clibadium surinamense*); haiari-balli (*Muellera* sp.); yarro-conalli (*Tephrosia toxicaria*); Conaparu (*Euphorbia cotinoides*); Daukanai (*Phyllanthus* sp.).

Recently, interest has been aroused in connection with some of these plants, because of the fact that they possess powerful insecticidal properties which give promise of being of commercial importance. In 1926, Mr. Altson, Government Botanist, sent specimens to Mr. F. Tattersfield of the Rothamsted Experiment Station who has been investigating some of our local "fish poisons" as to their promise of being one of the new sources of supply for insecticidal toxins. According to Mr. Tattersfield, Conami might be of value if the flowers and fruit were carefully dried and shipped in sealed tins. Yarro-conalli roots proved to be very powerful insecticides, whilst most optimistic opinions have been expressed as to the value of Black and White Haiari. Both the roots and stems of White Haiari are powerful insecticides, the roots being particularly so. The stems of the Black Haiari are said to be as potent as the roots of the White Haiari. They are spoken of by Mr. Tattersfield as being "two of the most powerful insecticides that have so far come within our experience." It would seem as if our Haiari, if found in any available quantity would be able to compete with Derris, certain species of which are the source of a toxin used at present in commercial insecticides. Plants of Yarro-conalli have been planted at the Nurseries, Botanic Gardens. It is planned to start cultural experiments with Haiari and other "poison" plants at the Agricultural Station in the North West District, with a view to securing data on habits, growth, etc. Thus some idea may be obtained as to whether the nature of these indigenous plants is such as to hold out hopes of their being exploited commercially.

The Forestry Department is co-operating in this work by studying the natural distribution of Haiari and other plants of this nature in the forests of the Colony.

CENSUS RETURNS.

The following Table shows the numbers of acres under cultivation in 1927 in the three counties. They have been collated as usual from returns sent to the District Commissaries and District Agricultural Officers. After a careful perusal of these returns over a number of years, one is reluctantly driven to the conclusion that they are not sufficiently reliable except in the case of sugar to enable forecasting of the Colony's agricultural output annually to be made with any great degree of accuracy. Proposals have been put forward with a view to improving the methods of collecting these returns.

TABLE II.

Counties.	Nature of Crops and Acreage at December 31, 1927.								
	Cane.	Rice.	Coconuts.	Cacao.	Coffee.	Rubber.	Limes.	Ground Provisions.	Total.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Berbice	20,193	18,386	6,900	205	198	252	400	3,414	49,946
Demerara	36,363	9,400	13,890	1,000	3,000	1,148	66	6,950	71,817
Essequibo	2,715	9,554	7,000	151	2,076	400	203	3,491	25,590

A summary of the above shows the total cultivation as follows :—

Sugar cane	...	...	59,271 acres.
Rice (acres reaped 50,427)	...	...	37,340 "
Cacao	...	...	1,356 "
Coffee	...	...	5,272 "
Rubber	...	...	1,800 "
Limes	...	...	669 "
Coconuts	...	...	27,790 "
Provision Crops	...	...	13,855 "
Total			147,353 "

The distribution of Live Stock throughout the whole Colony is given as under :—

Berbice.—

Horses	...	...	...	477
Asses	...	...	...	4,852
Mules	...	...	...	513
Horned cattle	...	...	...	41,885
Buffaloes	...	...	...	28
Sheep	...	...	...	17,296
Goats	...	...	...	14,456
Swine	...	...	...	10,945

Demerara.—

Horses	...	...	...	332
Asses	...	...	...	2,743
Mules	...	...	...	1,076
Horned cattle	...	...	...	19,951
Buffaloes	...	...	...	86
Sheep	...	...	...	5,354
Goats	...	...	...	3,044
Swine	...	...	...	5,212

Essequibo.—

Horses	...	...	...	46
Asses	...	...	...	1,006
Mules	...	...	...	117
Horned cattle	...	...	...	9,610
Buffaloes	...	...	...	140
Sheep	...	...	...	1,297
Goats	...	...	...	2,264
Swine	...	...	...	1,913

Hinterland.—

Horses	...	...	...	3,200
Asses	...	...	...	2
Mules	...	...	...	4
Horned cattle	...	...	...	70,000
Buffaloes	...	...	...	11
Sheep	...	...	...	150
Goats	...	...	...	20
Swine	...	...	...	—

British Guiana.—

Horses	...	...	...	4,055
Asses	...	...	...	8,603
Mules	...	...	...	1,710
Horned cattle	...	...	...	141,446
Buffaloes	...	...	...	265
Sheep	...	...	...	24,060
Goats	...	...	...	19,784
Swine	...	...	...	18,070

BOARD OF AGRICULTURE.

During the year the oldest member of the Board, Mr. H. L. Humphrys, passed away. Mr. Humphrys was keenly interested in our agricultural problems and was ever ready to give freely of his vast fund of practical experience gained over two score years of an active agricultural life.

Order of the Board of Agriculture.—The undermentioned Order of the Board under Section 3 of the Plant Diseases and Pests (Prevention) Ordinance No. 26 of 1920, was unanimously confirmed at a meeting held on October 4, 1927 :

"The Board of Agriculture hereby prohibits the importation from any country or place whatsoever of any kind of earth or soil, including leaf-mould or wrappings, cases, packages or other coverings which contain or have contained such earth or soil or any article or material of whatever kind packed with such earth or soil: Provided that nothing in this Order shall apply to the importation of earth or soil by the Director of Science and Agriculture for scientific or agricultural purposes."

Agricultural Shows.—A successful County Agricultural and Live Stock Show was held on the Berbice Turf Club Grounds on March 31 and April 1. A District Agricultural Live Stock Show was held at Beterverwagting on April 20; this was also a success.

The Journal of the Board.—Four issues of the Journal, Volume XX.—Nos. 1, 2, 3 and 4 appeared during the year.

Agricultural Apprentices.—The system of indenture has continued. The scheme was started in 1905, during which time 82 boys presented themselves, of these about half were actually indentured. The training they received has been mostly horticultural. On the whole the system has not given the results expected and this question is receiving attention under agricultural education generally.

GENERAL REMARKS.

Soon after assuming duty a general survey of the agricultural situation in the Colony clearly indicated that if substantial progress was to be made, the Department as constituted would have to be re-organised and brought into line with the trend of modern agricultural thought. With this end in view, after careful study of the problem, I submitted to His Excellency the Governor a comprehensive report containing plans and policies for the organisation and future work of the Department. This Report was published as a Sessional Paper (No. 16A. 1927) of the Combined Court. It gives in outline the more important agricultural problems with which the Colony is faced and the steps considered necessary toward their solution.

One of the first recommendations made was the separation of the Government Analyst's division—the removal of the Government Analyst being already accomplished—in order that the Director might be relieved of the responsibility for administration of the work connected with Food, Drugs, etc., and the establishment of a properly constituted Department of Agriculture. This included the appointment of a Deputy Director of Agriculture and the establishing of agricultural experiment stations in the various districts throughout the Colony, with the appointment of agricultural officers to staff them. Such stations would also be the centres of extension and agricultural education. In this connection it may be added that work was begun before the end of the year, starting with the extension and improvement of the Station at Georgetown and the establishment of Pln. Cecilia on the East Coast as a sub-station.

Suggestions were put forward for the re-organisation of the Sugar Planters' Experiment Station, leading to more efficient control by the Department with increasing attention to the work of breeding and testing varieties.

Plans for the fullest development of the rice industry were drawn up and experimental work with that end in view immediately started. This involved:

1. The introduction into cultivation of varieties of varying crop duration—at present only one general type is grown, a five months rice, generally of high quality but not entirely suited to wide market demands.

2. The purifying of the strains at present grown and the maintenance of a proper seed supply.

3. The improvement of cultural methods generally ; all with a view to cheapening production costs, and meeting new and increasing market requirements.

Coconuts, coffee, bananas, citrus and other permanent crops, tobacco, fibres, etc., and various minor crops also received attention in the memorandum. In addition, such matters as agricultural education, drainage and irrigation, the extension of economic nursery work, the establishment of a livestock farm, improvement of library and publications, provision of centralized office and laboratory accommodation, were dealt with. At the same time proposals were made for efficient staff organisation and grading of officers, with a view to avoiding overlapping and dual control wherever it existed.

Through the courtesy of the Empire Marketing Board, Mr. H. C. Sampson, C.I.E., Economic Botanist, Royal Botanic Gardens, Kew, visited British Guiana from July 31 to September 14, during which time he made a study of the agricultural conditions of the Colony. I took the opportunity of Mr. Sampson's visit to discuss with him my plans for the re-organisation of the Department of Science and Agriculture and general agricultural policies and with most questions of importance he entirely agreed with the proposals as outlined by me. The whole plan has since had the approval of the Director of the Royal Botanic Gardens, Kew, to whom the Colony is indebted for his interest in this and other matters.

At a meeting of the Board of Agriculture held on October 4, the occasion was taken to briefly review the agricultural situation and to give the trend of opinion in respect to various topics pertaining to agricultural development.

In opening the Eleventh Annual Conference of The British Guiana District Agricultural Societies held in Berbice on August 9, I emphasised certain phases of the agricultural position pointing out the necessity for an active and vigorous Department of Agriculture equipped with vital necessities—not luxuries—for the building up of the whole structure of our economic life.

In conclusion, I should like to express my thanks for the assistance rendered by agriculturists and others and my appreciation of the co-operation of the staff during a difficult and trying period.

J. SYDNEY DASH,
Director of Science and Agriculture.

October 4, 1928.

REPORTS OF THE DEPARTMENT OF SCIENCE AND AGRICULTURE
FOR THE YEAR ENDED 31st DECEMBER, 1927.

APPENDIX I.

REPORT OF THE GOVERNMENT ANALYST.

APPENDIX I.

REPORT OF THE GOVERNMENT ANALYST FOR THE YEAR ENDED 31ST DECEMBER, 1927.

SIR,

I have the honour to submit my report on the working of the Government Laboratory for the year ended 31st. December, 1927. During this period five thousand nine hundred and eighty-three samples were received for analysis and examination, being an increase of fifty-three as compared with the previous year.

2. Five thousand eight hundred and seventy-six of the samples were sent officially by various departments and authorities and were received from the following :—

1. The Comptroller of Customs	...	...	1,359
2. The Inspector General of Police	...	...	2,563
3. The Chief Commissary	...	...	381
4. The Government Medical Officer of Health	...	...	669
5. The Municipal Medical Officer of Health	...	...	802
6. The Director of Agriculture	...	...	11
7. The Director of Public Works	...	...	12
8. The Surgeon General	...	...	11
9. The Conservator of Forests	...	...	25
10. The Colonial Secretary	...	...	3
11. The Commissioner of Lands and Mines	...	...	36
12. The Managing Director, Colonial Transport Department	...	...	2
13. The Government Electrician	...	...	2
Total			5,876

3. The number of private samples analysed was one hundred and seven.

4. The samples received during 1927 may be classified as under :—

1. Viscera and exhibits suspected to contain poison	...	23
2. Clothing for corrosive poison	...	7
3. Food and Drink (sent for fiscal purposes)	...	181
4. Food and Drink (sent for non-fiscal purposes)	...	3,931
5. Petroleum, Petrol, etc.	...	226
6. Drugs, Oils, Varnishes, etc. (fiscal)	...	163
7. Tobacco (fiscal)	...	328
8. Sugar and Molasses	...	23
9. Manures	...	2
10. Waters	...	14
11. Aerated Drinks (including materials for making same)	...	89
12. Forests Products	...	24
13. Soils	...	5
14. Malt Liquors	...	3
15. Hydrometers, Polariscopes and Thermometers	...	153
16. Wines and Liqueurs	...	300
17. Spirits (Customs)	...	46
18. Coloured Rum, Colouring Matter and Sediment (Excise Department)	...	112
19. Illicitly Distilled Spirits	...	14
20. Bitters and Cordials	...	7
21. Methyated Spirits (and materials for making same)...	...	90

22. Rocks and Minerals	...	...	36
23. Bay Rum (including denaturants for)	...	...	51
24. Exhibits in counterfeit coining cases	...	...	43
25. Opium	...	...	13
26. Medicinal Tinctures (Excise Department)	...	...	66
27. Sewerage Effluent	...	...	1
28. Miscellaneous	...	...	32
Total			5.983

5. *Substances including Viscera suspected to contain Poison.*—Eleven cases of alleged poisoning entailing the examination of thirty exhibits were reported during the year under review ; of these cases three were fatal. Poison was found in eighteen of the thirty exhibits. In one case mercuric chloride was extracted from the vomit and stomach washings. In two cases datura was found, and a sample of rum contained a phenol disinfectant. One of the exhibits contained $1\frac{3}{4}$ grain of white arsenic. Seven articles of clothing had been partially destroyed by a corrosive fluid, and sulphuric acid was detected on these.

6. *Articles of Food and Drink.*—Four thousand one hundred and forty-seven samples of food and drink other than spirituous liquors submitted for examination for non-fiscal purposes were examined under the Sale of Food and Drugs Ordinance. Of these two hundred and seventy-three were returned as adulterated, this being at the rate of 6.58 per cent. as compared with 6.95 per cent. in the previous year.

7. *Milk.*—Three thousand five hundred and seventy samples of milk were analysed of which 257 were found to be adulterated equal to 7.2 per cent. which is the lowest return on record. Of these adulterated samples one hundred and sixty three or 4.6 per cent. were watered, and ninety-four or 2.6 per cent. were deficient in butter-fat.

8. Towards the end of the year an apparatus was received for the determination of the dirty sediment in milk. Twelve samples of milk can be analysed with this apparatus at the same time. Of sixty samples examined, six contained over two parts per hundred thousand of dirt. This is due to the fact that most of the milk vendors strain their milk through cloth prior to being sold.

9. The condition of the milk supply of the Colony, as far as can be judged by the results of the analysis of samples purchased shows a further improvement on that of previous years.

10. *Foodstuffs other than Milk.*—Five hundred and seventy-seven samples of foodstuffs, other than milk were submitted for examination. Of this number sixteen or 2.77 per cent. were returned as adulterated. The adulterated samples consisted of three samples of butter which were deficient in butter-fat, five samples of phalkaghi or vegetable fat were sold as pure ghi, five samples of cheese which were prepared from skimmed milk and deficient in their fat content, and three vinegars were found to contain extraneous water. All other samples of foodstuffs submitted for examination proved to be satisfactory and in accordance with the standards of purity laid down in the First Schedule of the Ordinance. I may again point out that samples of these foodstuffs are regularly taken by the Customs Department on arrival in the Colony and analysed by this Department as to their compliance with the standards of purity as defined in the Food and Drugs (Consolidation) Ordinance, 1918. Samples which do not conform with the requirements of the law are refused admission into the Colony; whilst samples of those admitted and distributed to the various retailers are examined from time to time to ascertain whether adulteration is being practised subsequent to importation.

11. One hundred and twenty-one samples of aerated water, and sixty-two samples of ginger beer and mauby were examined under the Ordinance. These were all found to be of good quality and free from metallic impurities. The aerated water factories were regularly visited throughout the year. The samples of ginger-beer and mauby were also examined for their alcoholic content and in each case found to contain not more than four per cent. of proof spirit.

12. *Opium*.—Thirteen samples of substances suspected to contain opium or its preparations were analysed on account of suspected breaches of the Opium Ordinance.

13. *Counterfeit Coining Cases*.—Forty-three exhibits in connection with counterfeit coining were examined. Of these fifteen were genuine coins and twenty were counterfeit. Six specimens of various alloys, and two samples of plaster of Paris were also analysed.

14. *Illicitly Distilled Spirits*.—Fourteen samples of spirits were received from the Police Department. Of these thirteen were found to be the product of illicit distillations, locally termed "Bush Rum."

15. *The Receipts of the Laboratory*.—During the period under review the receipts of the Laboratory from the fees paid into the Treasury by private persons and firms for examinations made for them amounted to two hundred and forty-two dollars and five cents. The Treasury also received three thousand three hundred and twenty-seven dollars and ninety-two cents as fines inflicted under the sale of Food and Drugs Ordinance, the total receipts due to the work of the Laboratory thus amounting to three thousand five hundred and sixty-nine dollars and ninety-seven cents. Milk vendors were responsible for three thousand two hundred and forty-one dollars and ninety-two cents of the above mentioned fines. Fines inflicted on milk vendors for samples taken on Sundays, Public Holidays and after official hours (including above) amounted to one thousand one hundred and seventy-three dollars and fifty-six cents.

I have honour to be,

Sir,

Your obedient Servant,

W. FRANCIS,
Government Analyst,

The Director of Science and Agriculture.

REPORTS OF THE DEPARTMENT OF SCIENCE AND AGRICULTURE
FOR THE YEAR ENDED 31ST DECEMBER, 1927.

APPENDIX II

REPORT ON THE WORKING OF THE BIOLOGICAL DIVISION.

APPENDIX II.

BIOLOGICAL DIVISION,
MARCH 23RD, 1928.

SIR,

I have the honour to submit the following report on the working of the Biological Division of this Department for the year 1927.

During the absence from the Colony of the Acting Director, Mr. W. Francis, I acted Director for the period January 21st to 30th. In addition during the year I continued as Curator of the British Guiana Museum, and during the months of September, October and November lectures on Nature Study were given at Queen's College.

The investigations of the Division for the year will be dealt with now under the crops concerned.

Sugar-cane.—During the year there occurred on this crop an extensive and apparently unprecedented outbreak of Yellow Sugar-cane Aphis, *Sipha flava* Forbes, which embraced all the sugar-growing areas of the coastlands. The insects it would appear were first observed in Berbice on the Courantyne Coast but the date on which they first made their appearance cannot be stated definitely as their occurrence was not reported to this Department, although the presence of the insects apparently caused much anxiety. From information received the insects were present at least on one of these estates in March.

Outbreaks were subsequently observed in Berbice and on the East and West Coast Demerara and on the East and West Bank, Demerara. In most instances the outbreaks were soon brought under control by natural enemies in the form of the Coccinelids, *Neda sanguinea* L. and *Megilla maculata* De Geer. In some localities *Neda sanguinea* was heavily parasitized in the larval stage by a small Chalcid *Homalotylus flaminus* Dalm, which did much to reduce the usefulness of that insect.

In most outbreaks the Lamproyrid *Aspidiosoma stricticum* Germ. also occurred in large numbers, feeding on the sweet excretion of the Aphid which collected on the leaves. On several occasions the common red ant *Solenopsis geminata* F. was observed to foster the aphid, and invariably in such fields the outbreak was severe and often of long duration.

On two estates the attack of the insects persisted several months in certain fields, and on investigation it was found that this condition was associated with bad drainage, and indeed that the presence of the aphids served rather as an indication of such conditions. In these fields the weed flora present was observed to be that more usually found on water-logged lands of the Colony, and even included vegetation that is generally considered entirely aquatic in habit such as *Mucca-mucca*, *Mortrichardia aculeatum* Creug, and a sedge *Cyperus ferox* Rich. known locally as 'Bizzi-bizzi'

Attacks on very young seedlings by the Army Worm, *Laphygma frugiperda* S. and A., were also observed. Owing to the extreme delicacy of these tiny plants the application of arsenicals was impracticable, but the desired protection was obtained by screening with muslin.

The question of the importation of parasites to combat small moth-borers again recurred during the year. This matter has already been dealt with in a previous report.

It may be mentioned here that during the year shipments of the larval parasites of *Diatraea*, *Iproboscus granadensis* Ashm. and *Microgaster diatraea* Turn. were made by Messrs. S. Davson & Co., Ltd., Berbice, to the Agricultural Departments of Barbados and Antigua. In all several thousands of these insects were shipped from the estates of this firm. This exportation however was not carried out in conjunction with this Department, but by direct arrangement with Messrs. Davson & Co., and is mentioned here only for the purpose of record.

Rice.—During the early part of the year the Courantyne District was visited in connection with an outbreak of the Moth Borer, *Diatraea saccharalis* Fabr., in this crop. It was apparent that much could be done to bring this pest under control if the measures suggested in my last annual report were adopted. The present system of farming does much to encourage, and to actually propagate, this insect, and it is essential that such practices be discontinued if relief from the pest is to be expected.

An account of the damage performed by this insect and the measures recommended for its control were published in the *Official Gazette* of May 14, 1927, and in the *Journal of the Board of Agriculture*, Vol. XX, No. 3, 1927.

A visit was paid to the Essequibo Coast and instructions given as to the method of combating the Paddy Bug (*Mormidea poecila* Dahl.) and the Moth Borer.

In June a report was received from the Courantyne District of attacks on young rice plants by the common large snail, *Ampullaris* sp. or "Crecete" as it is called locally. The control adopted, the drawing off of the water from the plants, was successful in checking the damage caused by the molluscs. This snail is preyed upon by the hawks *Rhostrhamus sociabilis* and *Polyborus cherwayi*.

Damage by the Rice Water Weevil, *Lissorhoptrus* sp. was observed to a small extent in some areas, but apparently nowhere did it reach the proportions of the previous year.

Coconuts.—Damage by the Coconut Caterpillar *Brassolis sophorae* L. began to be noticeable amongst the coconut palms in the Albervtown District of Georgetown about the middle of the year. A notice calling attention to the presence of this insect and the damage it was performing, and recommending measures for its control was published in the *Official Gazette* of 20th August, 1927, and notices posted throughout the city especially in the affected district, and at the same time attention was drawn to the insect through the columns of the Press.

The result of all this was that perhaps half-a-dozen owners cleaned their palms. On this occasion the owners in no way acted differently from that of previous outbreaks in spite of past experience and in this instance timely warning.

It is quite evident therefore that unless the owners of such palms in Georgetown are compelled to adopt control measures against this insect the palms of the city will be periodically defoliated and rendered extremely unsightly to say nothing of their acting as a nidus of infection to other coconut palms in the neighbour of Georgetown.

A large poster in colour dealing with the insect has been prepared and was exhibited at the Berbice and other Agricultural Shows during the year. It is hoped at some future date to have printed copies made for distribution during the outbreaks of the pest.

Other outbreaks of this pest occurred in February in the Mahaicony District at Now or Never and at Drill.

Work on the Coconut Stem-borer, *Castnia daedalus* Cram., has continued during the year as opportunity has allowed, and much information is being gradually accumulated on this pest. This insect has been responsible for the death of several

cabbage palms, *Oreodoxa oleracea*, in Georgetown recently. These palms appear to succumb to the first attack of this insect and cannot like the coconut palm exist for years with a heavy infestation.

MISCELLANEOUS CROPS.

Ground Provisions.—In July a report was received from the North Western District of an outbreak of "Cockles," a term applied indiscriminately to several beetles, and a visit was made to that district. The crop attacked was tannias (*Xanthosoma*), which forms an important catch crop in the establishment of coffee cultivation on the pegass soils of the district. Investigations proved the insect to be *Ligyris ebenus* DeG., which is known on the coastlands as the occasional pest of sugar-cane.

It would appear that this insect has caused severe damage to the Tannia crop of the district for at least some fifteen years past.

Owing to the lateness of the season it was not possible to carry out any extensive investigations, although a few points of importance were elucidated. Although not entirely unaffected the "white" variety Tannia is less attacked than the yellow variety and as there appears to be an equal demand for either variety it would seem advisable to cultivate more extensively the white variety and thus avoid the heavy attacks of this insect.

A number of adults of the insect was collected and brought into the laboratory for life history studies. The information gained in this direction up to the present points to a pre-oviposition period of several months and that egg-laying is at its height in November and December. The egg period is short, being about 16 days.

Citrus.—An attack of snails on citrus plants was reported from the Experimental Fields in December. These were effectively controlled by banding the plants with Tanglefoot.

OTHER INVESTIGATIONS.

Silk.—Investigations on sericulture have been continued this year. Eggs that arrived late in the previous year, after being kept in cool storage, were subsequently hatched and worms reared from them. The hatch from all varieties was poor, and this together with an outbreak of disease amongst the worms, must be considered as the cause of the discouraging results obtained.

Correspondence with the Imperial Institute resulted in a further shipment of eggs of still different varieties. These arrived on 20th September and were placed in cool storage. Some of the eggs were removed from cool storage on 12th December after two months at a temperature of 36° F., while other lots were submitted to longer periods of storage at the same temperature. The experiments have not yet been completed, and will be treated elsewhere at a later date.

Plant Protection Service.—Inspection of plant imports was carried out during the year at Georgetown. The Banana Weevil *Cosmopolites sordidus* Germ., which is not known to occur in the Colony at present, was intercepted in a shipment of Banana suckers of the Gros Michel variety imported from Trinidad by this Department.

By an order of the Board of Agriculture issued on 4th October, 1927, all plants in soil are prohibited entry into the Colony and all plants arriving in the Colony in soil were destroyed in accordance with this Order.

Much difficulty is encountered in making Orders and the subsequent enforcement under the present Plant Diseases and Pests (Prevention) Ordinance, both with regard to plant importation and for internal use, and there is an urgent need for an entirely new Plant Protection Ordinance.

Tours and Visits.—In August a tour was made of the County of Berbice with Mr. H. C. Sampson, Economic Botanist on the staff of the Royal Botanic Gardens, Kew. The Courantyne, the New Amsterdam, and the West Coast Districts were visited, and sugar-cane, rice, coconut and lime cultivations inspected.

The Bartica District was also visited with Mr. Sampson in September, and the cultivations in this area inspected.

A large amount of travelling was done in addition during the year and all the important cultivated areas from the Courantyne to the Essequibo and North Western District, were visited including many sugar estates.

Publications.—During the year two papers on insects have been prepared and published. These were :—

The Rice Moth Borer and Recommendations for its control, *In Jour. of Board Agriculture, British Guiana, Vol. XX., No. 3, July, 1927, and Official Gazette, British Guiana, 28th May, 1927.*

“Cockles.” *In the Jour. of the Board of Agriculture, British Guiana, Vol. XX, No. 3, July, 1927.*

Collection.—During the year a considerable number of insects was added to the collection. The Collection has also been maintained in good condition and several new cases added. The catalogues have been kept up to date, and the preparation of a Catalogue of British Guiana Insects commenced, all of which have entailed much work.

Loans have been made to Dr. J. Chester Bradley and Dr. P. P. Baiby of Cornell University, Ithaca, U.S.A., of Scolidae and Bombidae respectively, from the collection of this Division.

Consignments of insects for determination have been sent at intervals to the Imperial Bureau of Entomology, and determinations received. The Bureau has continued to render valuable service to this Division, and opportunity is now taken to acknowledge this assistance and that of the various specialists who have made the determinations including Dr. G.A.K. Marshall, Director of the Bureau, Mr. G. E. Bryant, Mr. F. W. Edwards, Dr. C. Ferriere, Mr. F. Laing, and Mr. F. Uvarov.

I have the honour to be,

Sir,

Your obedient Servant,

L. D. CLEARE, Jnr.
Government Economic Biologist.

The Director of Science and Agriculture.

REPORTS OF THE DEPARTMENT OF SCIENCE AND AGRICULTURE
FOR THE YEAR ENDED 31st DECEMBER, 1927.

APPENDIX III.

REPORT BY THE TRAVELLING INSPECTOR.

APPENDIX III.

DEPARTMENT OF SCIENCE AND AGRICULTURE,

GEORGETOWN, DEMERARA,
May 15, 1928.

SIR,

I have the honour to submit a résumé of the work done by the Agricultural Instructors during the year 1927.

THE NORTH WESTERN DISTRICT.

The weather for the most part of the year was favourable. The Resident Instructor reports that farmers on the whole are paying more attention to their drainage. Coffee still remains, with the exception of small areas in Limes and Para Rubber, the only permanent crop. Liberian coffee does well on the pegass soils. The Instructor still finds that more attention should be given by farmers to pruning. The disease caused by the fungus *Sclerotium coffeicolum* which was observed as parasitic on Liberian coffee by the late C. K. Bancroft in 1914-15 was present in this district during the year. This disease occurs on the majority of coffee farms in the North West, where it has been present for the last ten or twelve years. The Instructor expresses the hope that farmers will keep their Liberian coffee topped at a reasonable height, so as to afford them an opportunity to spray effectively and cheaply against it.

With regard to Para rubber (*Hevea brasiliensis*), the South American Leaf disease (*Melanopsammopsis heveae*) being endemic in the district, this fact coupled with the somewhat low price of the product has caused active interest in this crop to wane. Trees planted on the hills and hillslopes do not appear to suffer so readily from attacks of this fungus as do trees planted on the flats. Messrs. Garnett & Co. are the only company tapping. The area has not been increased and there is little prospect of there being any augmentation in the near future.

Cacao.—This is confined chiefly to the Mabaruma hills. The plants are healthy but the Instructor reports that yields are small. It is a pity that more interest is not evinced in this cultivation, as many of the hills and hill-slopes appear suitable for the extension of this crop.

Limes.—No attention has been paid to the cultivation of limes. According to the agricultural census there are over 70 acres under limes, but the cultivation has been practically abandoned. In these abandoned areas the trees still maintain good health and bear well. With the high prices that had been ruling for distilled oil of limes it would appear that growers might find it advantageous to consider this aspect of the question.

Ground Provisions and Corn.—It is satisfactory to learn that the cultivation of these crops was well maintained during the year, that there are large areas under cultivation, which are well looked after and intelligently planted, rotation of crops being practised by many. Unfortunately "cockles" (*Ligyra ebenus* DeG.) appeared in large numbers during the year, doing considerable damage, especially to tannias and eddoes.

The following table gives the census of agricultural industries carried on at present in this district :

SECTIONS,	Rice.	Sugar Cane.	Coconuts.	Rubber.	Coffee.	Cacao.	Limes.	Maize, Plantains, Bananas and Ground Provisions.	Total cultivation.
	Aores.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Barima River	10	1	1	...	170	$\frac{1}{2}$	...	162 $\frac{1}{2}$	345
Waini River	...	...	...	...	20	...	...	...	20
Mora Passage	...	...	$\frac{1}{4}$	...	10	$\frac{1}{4}$	...	10 $\frac{1}{4}$	21
Mabaruma Hills	...	...	...	...	24	15	70 $\frac{1}{2}$	9 $\frac{3}{4}$	118 $\frac{3}{4}$
Aruka River	6	...	...	100	517	...	...	73 $\frac{3}{4}$	696 $\frac{3}{4}$
Koriabo River	...	7	10	...	280	4	...	162 $\frac{1}{2}$	463 $\frac{1}{2}$
Kaituma River	...	...	...	...	17	...	...	13	30
Imhotero Creek	...	...	1	...	54	...	...	69	124
Arukaimai	...	...	...	...	...	4 $\frac{1}{2}$	...	10	14 $\frac{1}{2}$
	16	8	12 $\frac{1}{4}$	100	1,092	24 $\frac{1}{2}$	70 $\frac{1}{2}$	510 $\frac{1}{2}$	1,833 $\frac{1}{2}$

The Department's agricultural station is at Hosororo on the Aruka river and consists at present of chiefly Para rubber. The other permanent trees found are a few balata (*Mimusops* sp.), tonka bean (*Dipteryx odorata*), tibicushi (*Brosimum* sp.) cacao, coffee, nutmeg, mango, orange, shaddock and limés.

Tapping of 873 rubber trees was carried on for a short time during the year ; 702 lbs. 10 ozs. of sheet and 89 lbs. 14 ozs. of scrap were obtained.

POMEROON.

Mr. H. B. France, Agricultural Instructor, reports that weather conditions were more favourable than those of last year. The farmers appear to have made a quick recovery from the effects of the drought conditions prevailing in 1925-26. The Instructor visited farms regularly and assisted growers in every way. The crops in this district comprise : coffee, coconuts, cacao, plantains, bananas and ground provisions, rice and Para rubber. The coconut palms for the most part are in need of drainage and appear to be suffering from "wilt" disease. Interest in coffee growing has been well maintained, fair crops have been reaped and good prices realised. The area under this crop is increasing. During this year two up-to-date engines in Messrs. A. J. Pires and J. J. da Silva's factories have been installed. Every effort is being made to encourage farmers to turn out a better cured coffee than formerly. Unfortunately the tendency to pick unripened berries still prevails, resulting in great damage to the marketable product.

Two crops of corn were reaped during the year, the average yield being 8 bags to the acre, while large areas of cassava, plantains, bananas and ground provisions gave very good returns ; the prices realised for these crops were, however, disappointing.

The Instructor has made efforts during the year to awaken interest amongst farmers in cattle, pig and poultry rearing.

The sub-station at Marlborough which is the headquarters of the Instructor has received attention and such products as arrowroot, ginger, ground-nuts, pine-apples and kitchen garden vegetables have been carried out with encouraging results.

ESSEQUIBO.

Visits were made to the Essequibo coast in connection with the improvement of seed padi, as well as to Agatash to give advice as to re-establishing this estate, during February ; whilst later on in the year the islands of Wakenaam, Hog, Liberty, Hamburg, Jackey, Karataro and Great Troolie, were inspected. There is need for improvement of seed padi in Wakenaam and all the other islands on which

rice is cultivated. Coconuts are grown extensively in Wakenaam and a fair amount of copra is shipped from the island. Pln. Marionville is the only sugar estate on this island. Hamburg is under rice and coconuts. In some areas the coconuts are doing particularly well and very good copra is produced. At Hog Island there is a fair amount of disease amongst the coconuts, probably a "wilt" disease. "Plantain disease" is also prevalent on this island.

On the smaller islands "Milpa" agriculture is practised. All these islands would well repay attention. On the majority, the soil is a sandy loam and is suitable to coconuts and many other crops.

EAST AND WEST BANKS, AND WEST COAST, DEMERARA.

Several visits were made by the Travelling Inspector to the East and West Banks and West Coast of Demerara.

With the re-organisation of the Department, the services of three "part-time" District Instructors were dispensed with at the end of the year,—viz., Mr. T. A. Archer (West Coast, Demerara, and the island of Leguan); Mr. J. N. Antrobus (West Bank, Demerara to Vreedenstein); Mr. C. Humphrys (East Bank, Demerara, to Pln. Coverden). It is proposed to work this district by an officer attached to headquarters.

On the upper reaches of Canals Nos. 1 and 2, Liberian coffee is growing well. The trees are all "topped" and very little disease is apparent. There are some good citrus fruit to be found in Canal No. 1. A large number of avocado pears has been planted in the Canals as well as fair areas in pineapples. Several hundred suckers were collected and forwarded to headquarters for experimental purposes.

At Haags Bosche on the East Bank, Demerara, a start has been made to improve the cacao cultivation.

A visit was made to Vryheid, some forty miles up the East Bank of the Demerara River, in July, and also to Susannah's Rust, about 15 miles up, on the West Bank.

On the East Bank a Farmers' Prize Competition was carried out—the final judging taking place in November. The previous competition had been held about 20 years ago, hence the farmers in this district need to be educated as to what purpose such competitions are expected to serve.

On the West Coast, as was reported by Mr. Archer on several occasions, "Plantain Disease" is prevalent. The necessity for eliminating "bad" padi from this important rice-growing district is urgent. The coconut cultivations on this coast, with few exceptions, are neglected. A small amount of tobacco is grown and very successfully cured by Mr. Archer.

An experiment on a large scale was made with groundnut cultivation at Pln. "Uitvlugt," with unsatisfactory results, chiefly due to unsuitable soil and variety.

EAST COAST, DEMERARA.

The Agricultural Instructor, Mr. C. C. Dowding, has his headquarters at Golden Grove. He reports that much progress has not been made with ground provisions on the pegass soils aback owing to inadequate drainage with the result that a number of cultivators lost their crops by floods. The cultivations on higher lands consisting of clays and loams did not suffer much from heavy rains and were maintained in good order. The coconut palms are reported as having recovered from the effects of the 1925-26 drought, but the drainage of many of these coconut areas is still not what it should be.

With respect to sugar-cane, the Instructor has stressed the importance of smaller areas and more intensive cultivation.

Great efforts were made to impress upon rice-growers the practical importance of making a determined and concerted effort at the destruction of bad types of rices and the selection of good seed padi.

It is pleasing to note that more interest is being taken in fruit growing and farmers have made efforts to prune, mulch and generally taken care of their fruit trees. During the year the Instructor obtained Liberian coffee seed and grew a number of seedlings, distributing 300 plantlets to farmers at Buxton and Friendship in the hope of starting this cultivation again—many of these trees are doing well.

His Excellency Sir Cecil Rodwell started the growing of groundnuts on about $1\frac{3}{4}$ acres of sandy loam, on the front lands of "Pln. Enmore" during May. The laying out and supervision of this area, to which the name of "Pln. Cecilia" was given, was carried out by the Instructor.

A successful agricultural show was held at Beterverwagting during April, the Show being declared open by His Excellency the Governor, Sir Cecil Rodwell, K.C.M.G.

BERBICE.

The Agricultural Instructor, Mr. W. H. Matthews, is resident in New Amsterdam; the outlying districts are served by the part-time district officers, Mr. R. R. Ross on the West Coast, Mr. D. W. Fingal on the Corentyne Coast, and Mr. J. M. Cush on the Berbice River.

The rainfall recorded by the gauge kept at the New Amsterdam Gardens was 132 inches 71 parts for the year. A successful agricultural show was held on March 31 and April 1, His Excellency the Governor kindly declaring the show open.

The principal crop grown by the small agriculturist in Berbice is rice. The weather conditions were favourable and good returns were reaped. The lack of drainage and irrigation, however, still makes the results of this crop one of hazard when growers are farming away from sugar estate lands. The need for elimination of "red," "bearded" and other undesirable types of rice exist here as in other parts of the Colony.

With respect to coconuts, part of Pln. Maida on the Corentyne and Pln. Phoenix on the West Coast, the cultivations consist for the most part of small plots. Efforts are being made to impress upon growers the necessity for selecting suitable soil and good types of nuts from trees in the best of health and of a suitable age.

There is room for extension in connection with plantain and ground provision growing, since shipments of plantains, tannias, etc., still come regularly to New Amsterdam from other parts of the Colony.

Cacao and coffee are still neglected. The latter at one time was an important crop, Berbice coffee obtaining an enviable reputation in the London market. In 1831 there were 40 coffee estates in Berbice. A few trials of groundnuts had been made whilst one or two enterprising farmers have given some attention to fruit-growing.

The Instructor has pointed out the necessity that exists for making some effort to improve the type of pig which is being reared; with one or two notable exceptions the class of pig seen is a disgrace to farmers.

COURSES IN ELEMENTARY AGRICULTURE AND HORTICULTURE FOR PRIMARY SCHOOL
TEACHERS.

During August, a short course in elementary agriculture and horticulture was given to a number of primary school teachers. The officers in charge of the lectures were Messrs. A. A. Abraham, E. Beckett, C. L. C. Bourne and S. N. Bruce.

I have the honour to be,

Sir,

Your obedient Servant,

EDGAR BECKETT,
Travelling Inspector.

The Director of Science and Agriculture.

**REPORTS OF THE DEPARTMENT OF SCIENCE AND AGRICULTURE
FOR THE YEAR ENDED 31st DECEMBER, 1927.**

APPENDIX IV.

REPORT ON THE WORKING OF THE BOTANIC GARDENS.

APPENDIX IV.

BOTANIC GARDENS,
GEORGETOWN, DEMERARA,
April 30, 1928.

SIR,

I have the honour to submit the following report on the working of the Botanic Gardens for the year ended December 31, 1927.

Ornamental Section.—Much improvement has been made in the Botanic Gardens during the year under review, with such changes that have enhanced the beauty and have improved the general aspect of the Gardens. Groups of shrubs which grew in association with trees and interrupted the vistas have been removed, and the plots merged into the adjoining lawns. The tree-forms, now, also, stand out in greater relief. The shrubs have been transplanted into more suitable situations with a view to mass-effect.

In the Park Lands, self-sown trees and all thick vegetation which surrounded the lakes have been cleared; and openings made through the clumps of bamboos, thereby improving the water scenes of the upper portions of the Gardens. The trees in the avenue were judiciously pruned during the latter months of the year.

In the course of the year, a floral scheme was drawn up, whereby the parapets of the beds in the Flower Garden section were well-maintained with a variety of annuals. In the southern portion of the Gardens a fine display was made of a maroon-coloured *Coleus* planted in a circular bed with a yellow flowering *Portulaca* planted around on semi-circular plots. In this section, also, two new beds were made on which *Eranthemum eldorado* surrounds the plots with *E. tricolor* planted in the centre. The effect of the yellow-coloured foliage of the *E. eldorado* blending with the glistening sheen of the leaves of *E. tricolor* is very attractive.

Lawns.—Further progress has been made during the year under review in connection with the renovation of the lawns. Work was concentrated on the lawns of the western section of the Gardens during the latter months of the year. These were in utter disrepair, therefore, it was necessary to push forward the work in this section. The sites were ploughed, carefully levelled and rolled; and the cultivation of a sward of pure Bahama grass, *Capriola dactylon* was far advanced at the close of the year.

Irrigation and Drainage.—Further attention was given to the renewal of old and worn sections of water-pipes of the irrigation system. The north side-line trench which was neglected for some time received a thorough cleaning towards the close of the year. The arterial drainage was kept in good order during the year.

Roads.—In September, two fairly large heaps of earth were burnt for road material. Sections of the roads were thereby repaired. In places which were badly worn into ruts and pools, the roads were patched with granite, and burnt earth spread on the surface.

Nurseries.—The activities of the nurseries were well maintained during the year. In the ornamental section the stock of Ferns, Begonias, Caladiums, Anthuriums, Crotons, and other ornamental shrubs were increased for sale. In the economic section budding and grafting received attention. Several hundred seedlings of citrus plants have been grown to be used as stock for budding purposes.

Grafted Mangoes.—No crop was obtained during the period under review from the different varieties of Grafted Mango trees listed on page 9 of last year's report. This was due to unfavourable heavy rainy weather conditions experienced during the flowering period.

The following table shows the work carried on in the Nurseries during the year :—

TABLE I.

No. of seeds sown	...	...	49,776
Seedlings basketed	...	...	10,553
Seedlings potted	...	...	4,206
Plants rebasketed	...	...	1,464
Plants repotted	...	...	2,654
Plants top-dressed	...	...	1,203
Plants divided	...	...	861
Plants layered	...	...	1,680
Plants grafted	...	...	145
Cuttings basketed	...	...	262
Cuttings planted in beds	...	...	2,755
Plants tubbed	...	...	98

The following table gives the sales of the Economic Section of the Botanic Gardens for the year under review :—

TABLE II.

MONTHS.	Coffee.	Cacao.	Grafted Mangoes.	Nutmeg Seedlings.	Other Economies.	Total.
January	16	218	...	157	37	\$ 8 68
February	6	60	...	19	53	3 38
March	...	89	...	1	123	5 73
April	1,006	...	...	30	36	17 12
May	21	...	...	25	116	3 91
June	...	...	...	12	416	6 74
July	6	...	4	8	90	3 90
August	926	...	...	2	379	19 82
September	...	...	...	12	184	3 56
October	...	...	...	10	15	66
November	...	...	...	2	54	1 28
December	6	...	...	6	43	1 30
Totals	1,987	367	4	284	1,546	\$ 76 08

The following table gives the receipts for the Ornamental Section for the year :—

TABLE III.

Items.	Amounts.
Plants ...	\$306 55
Flowers ...	115 30
Seeds ...	15 40
Bamboo ...	41 12
Delivery of plants and flowers	9 98
Pots ...	44 42
Hire of plants	21 16
Pound Fees	33 64
Total ...	<u>\$587 57</u>

Government House and other Gardens and Grounds.—The general routine work was carried out during the year in maintaining these gardens and grounds in good order and condition.

I have the honour to be,

Sir,

Your obedient servant,

A. A. ABRAHAM,
Horticultural Superintendent.

The Director of Science and Agriculture.

REPORTS OF THE DEPARTMENT OF SCIENCE AND AGRICULTURE
FOR THE YEAR ENDED 31ST DECEMBER, 1927.

APPENDIX V.

REPORT ON THE VETERINARY DIVISION.

APPENDIX V.

VETERINARY DIVISION,
DEPARTMENT OF AGRICULTURE.
Georgetown, Demerara,
30th April, 1928.

SIR,

I have the honour to submit the following report for the year 1927.

2. There were no serious outbreaks of disease amongst livestock throughout the Colony. The usual work at the Government Stud Farm was carried out. Nine foals were born, eight of these were the progeny of the stallion "Waterbass."

The first foaling period, during May, was particularly unfortunate in that three foals were lost within a space of 10 days—weather conditions were particularly bad, rain falling continuously. Post-mortem examinations revealed the cause of death to be enteritis. One foal strangled itself in its head rope, with which it had been temporarily tied. The remaining foals are full of promise and have responded particularly well to light supplementary feeds consisting of bran, bone-flour and molasses. Feeding with bone-flour to the mothers during the period of gestation appears to have a very beneficial effect on their foals.

The total number of animals on the farm at the end of December, 1927, was 24.

Four of Waterbass' three-year olds were transferred to the Mounted Police during July, 1927,—viz., three fillies and one colt. These animals carried on normal police duties during the year and should be useful acquisitions to the Mounted Force.

The usual records have been kept and should prove useful data in the future.

The control of the Stud Farm passed to the Police Department on December 31, 1927.

3. The following animals belonging to the Department died during the year:—

- 1 Shorthorn Bull "Duke" at Onderneeming School, during October, 1927.
- 1 Black-faced Shropshire Ram at Onderneeming School on January 17, 1927.
- Litter of piglets (19) from Large Blacks at Botanic Gardens during December, 1927.
- 1 Black-faced Shropshire Ram, May 17, 1927, at Botanic Gardens.
- 1 Black-faced Shropshire Ram at H.M. Penal Settlement on June 23, 1927.

4. The animals at Onderneeming and H.M. Penal Settlement are now under the control of the Superintendent of the School and the Inspector of Prisons. Frequent visits have been paid to these Institutions, the animals at which are in fair condition. Visits have been made when necessary, to the Lunatic Asylum, Berbice, and the Leper Asylum, Mahaica, and certain recommendations with respect to the housing and feeding of livestock have been made to the Medical Officers responsible. When in Georgetown I usually pay daily visits to the animals kept at the Botanic Gardens, whilst several visits have also been made to the animals of the Public Works Department. The animals at the Alms House have also received attention.

5. Many tests in connection with anthrax, tuberculosis and osteoporosis, roup, etc., have been carried out by me during the year.

With respect to Georgetown, the percentage of tubercular milch cows is satis-

factorily low and I am convinced that, if there is any danger in this connection it will come from milch cows in the country districts. A series of tuberculin tests throughout the whole Colony have been started and will be continued during 1928.

6. During the year 4 sows, Large Blacks, and 1 boar of the same breed, were imported from the Trinidad Stock farm. Three of these sows farrowed in December; unfortunately all the litters died—weather and housing conditions being very much against them.

7. At the end of December the animals of this Department were stationed as under :—

Holstein-Freisian Bull "John"	...	at Onderneeming.
Shropshire Ram	...	" "
2 Holstein-Freisian (cows)	...	Botanic Gardens.
1 " " heifer-calf	...	" "
1 " " Bull	...	" "
1 Shorthorn Devon Bull 'Non Stop'	...	" "
1 Boar (Large Black)	...	" "
4 Sows " "	...	" "
Stallion Jack-Donkey 'Greatland'	...	" "
" " " 'Red-Cloud'	...	" "
" " " 'Tip-Top'	...	Police Station, New Amsterdam, Berbi
" " " 'Clay-King'	...	Botanic Gardens.

GENERAL REMARKS.

8. *Horses*.—These call for no special mention with the exception of the work done in connection with the police horses, reference to which has already been made.

Donkeys.—There has been an improvement in the breed of donkeys due to the importation of various suitable sires. On the whole the position with respect to these animals is fairly satisfactory; many of the progeny of the imported Jacks attain the height of 14 hands, with good conformation, vigour, bone and prepotency.

Cattle.—It is obvious that a Government Stock Farm is a necessity, but the present financial position makes such a venture at this time almost an impossibility. However, some improvement can be effected by careful selection and better management. Sires of known quality must be utilised. It is better to grow into dairying than to go into it—hence it is wiser to start with grades rather than sinking money in pure-breds. In this Colony the Aberdeen-Angus, the Holstein-Freisian and Zebu suggest themselves as breeds of possible utility; the Zebu, of course, mainly as range cattle suitable for draft purposes, but useful also in crossing for hardiness.

Cattle in this Colony are distributed along the coastlands, and in the Rupununi savannahs where large herds run semi-wild.

The cattle on the coastlands suffer terribly during drought, and likewise at the time of the heavy rainy seasons. In both seasons large numbers of animals perish. The pasturage is very poor, with the result that the animals lack condition and are often hidebound and deficient in bone—this last condition being probably due to a lack of phosphoric acid in their grazing. I have investigated several cases of osteomalacia in cattle, undoubtedly due to the lack of phosphates.

Elephant grass might be established in some districts with advantage. In the young stages of growth it is quite a useful fodder grass and appears to be suited to the soil and climatic conditions of this Colony.

The Rupununi cattle are larger, possess more vigour and furnish hides of better quality than the animals of the coastland.

Hogs.—Due to in-breeding there has been degeneration in swine. The majority of the local animals are now characterised by a long snout, razor-back, deficiency in bone and weight and late maturity; in general they are about as bad a type as may possibly be produced. The position could be improved by the importation of a number of pure-bred boars of the "Large Black" or Berkshire breeds. Considerable ignorance exists in respect to care and management.

Sheep.—There has been degeneration in this Colony on account of in-breeding. Most of the animals lack bone, vigour and quality and many are emaciated. A number of Black-faced Shropshire rams and ewes has been imported both by the Department and private individuals from time to time. On the whole the result has been disappointing and the type of sheep still remains undesirable. Apparently Shropshires are not suitable to the conditions prevailing in the Colony; many die during the hot months, whilst in the rainy season bronchitis and pneumonia are often present. I suggest that a number of woolless Barbados rams should be imported and be distributed to suitable districts. Their mutton conformation is medium, while the wool so short that it does not show through the hair, which ranges from $\frac{1}{4}$ inch to 2 inches in length, except from the lower jaw to the brisket, where it is long and coarse. The ewes breed at any season and produce twins and triplets more commonly than single lambs. They are good milkers. If these characteristics can be introduced without causing inferiority in other directions this breed should prove valuable for crossing.

Goats.—The raising of goats especially adapted to yielding large quantities of milk, offers attractions to the small farmer. They cost less than cows and their upkeep is comparatively small, whilst their milk is palatable, wholesome and highly nutritious, especially for infants. The goat is practically immune from tuberculosis. Owing to the lack of good sires, goats in this Colony are very disappointing. Investigations are needed with a view to developing types suited to local conditions.

Poultry.—Sufficient attention has not been paid in the past to the selection, breeding, sanitation and the general management of poultry, especially fowls, turkeys and guinea birds. Geese are hardly ever seen though with the abundant grass lands and suitable swimming streams that abound there is no reason why they should not be bred in large numbers, as these birds are hardy and are rarely attacked by disease or pests.

I have the honour to be,

Sir,

Your obedient servant,

SAMUEL BRUCE,
Acting Government Veterinary Surgeon.

The Director of Science and Agriculture.

